

ARTICLE

Exuberant optimism vs the precautionary principle

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ABSTRACT: Management of Earth's resources will not attain sustainability unless tough questions are asked and the merits and disadvantages of conflicting paradigms are rigorously examined. Two major conflicting paradigms are: (1) economic growth will solve all problems, including environmental ones—the free market has negated the dire environmental forecasts and relegated them to the status of myths; and (2) human society is dependent upon the planet's life support system—it assumes that the present rate of biotic impoverishment (e.g., species extinction, loss of habitat) will so alter the biosphere that it will be less habitable for humans. Dominant, global practices are based on the first assumption, which, if invalid, will have dire consequences for human society. For example, anthropogenic greenhouse gases causing a modest rise of global temperatures could produce 20 million environmental refugees from Bangladesh alone as a consequence of a sea level rise that would inundate 17% of the country's habitable land. Implementing the second paradigm would require major, mostly unpalatable, changes in human behavior. Since, at present, humans occupy only 1 planet, the precautionary principle suggests acting more cautiously with regard to economic growth until its effects upon the planet's ecological life support system are better understood.

KEY WORDS: Precautionary principle · Economic growth · Environmental protection · Ecological life support · Sustainability

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Knowledge of what is does not open the door directly to what should be.

—Albert Einstein

Man has lost the capacity to foresee and forestall. . . . He will end up destroying the earth.

—Albert Schweitzer

A prudent man sees danger and hides himself, the simple go on and suffer for it.

—Proverbs 27:12

HUBRIS

Hubris kills, as countless myths and folktales warn. During the 1999 football season, a traditional bonfire structure collapsed on the campus of Texas Agricultural and Mechanical University, killing 23 students.

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Collapses had occurred 3 times previously, 1 as recently as 1994. Officials at Texas A&M were well aware of the dangers and after the 1994 collapse had produced a handbook of guidelines and regulations to be followed by the engineers in charge of the annual project. The ecological ethics involved in such a public display on the campus of a center for higher education deserves a separate disquisition. The important aspect for this discussion is that, as of early December 1999, Texas A&M administrators were still wondering what to do about a 90-year-old tradition before rearranging their priorities. This indecision is almost certainly due to an uncertainty about long-term public opinion on this issue.

In a similar vein, but on a larger scale, Murphy (1999) links population growth and prosperity with densely populated Hong Kong as an example of hubris. If Hong Kong had a plastic dome over it, the air would soon become far less breathable, arguably fatal, unless

human behavior changed dramatically. Hong Kong is livable because it is embedded in a larger ecological life support system—it is literally propped up by an ecological life support system several orders of magnitude larger than itself. Weaken some of its props, and the area becomes unstable. Hubris is assuming the system is inherently stable. Except for the difference in scale, the ecological life support system is much like the Texas A&M log pile, except that the latter has been demonstrably unsustainable while the biosphere has not yet proven to be so as dramatically.

GLOBAL FALLOUT VS GLOBAL DIVERSITY

As Cohen (1995) notes, calculating Earth's carrying capacity for humans is virtually impossible. Uncertainties are too numerous, and all predictions are conditional. Still, population projections, such as Frejka's (1973), are worthwhile even if some are outdated. In one scenario, Frejka's estimate is about 15 billion people between 2040 and 2045. A United Nations (1992) projection has a high figure of about 28 billion. These projections, nearly 2 decades apart, have a difference far in excess of the 6 billion global total reached in 1999. Some major considerations are related to these projections. (1) Will biospheric feedbacks modulate these projections? (2) Will conflicts over resources (e.g., freshwater) damage both technological and ecological life support systems? (3) Will allocation of increasingly scarce resources result in more authoritarian governments? (4) Will the quest for ever increasing per capita material affluence negate the ecological benefits of population stabilization if or when it occurs? (5) If a finite planet will support only a finite number of humans, how will society know when it is near the threshold, or worse yet, has exceeded it? (6) What effects will further increases in human population size and affluence have on the already high species extinction rate?

ECOSYSTEM HEALTH

Arguably, exuberant optimism regarding sustainable use of the planet is most evident where ecosystem health is considered. An illustrative case (Casey 1999) notes that the City of Rio Rancho's utility director noted that the city is not convinced of the United States Fish and Wildlife Services claim that maintaining habitat for an endangered minnow would *require that the river have water in it the year round*. In another case, the State of New Mexico (Taughner 1999) officials want a water dispute settled in state court, where they believe it will be affirmed that *farmers own the water rights*. The health of the riverine ecosystem is not to be

a major consideration. In short, ownership of the water did not involve responsibility for the aquatic community's condition, which could easily be impaired by a significant change in either the quantity (thorough removal of water) or quality (through land runoff with suspended solids and pesticides). Since most sustainability initiatives have a strong local/regional component and lack a strong commitment to ecosystem health, the prospects for sustainable use of the planet seem dim! The assumption that ecosystems will continue to provide ecosystem services essential to human well-being, regardless of their treatment by society, is clearly an example of exuberant optimism.

Evidence of belief in economic growth paradigms abounds, but the belief in science and rationality appears far lower. Even though the evidence for deteriorating ecosystem health (i.e., biotic impoverishment, global warming) comes almost entirely from science, much of the evidence is being disregarded, often even vilified, for reasons based on political expediency. With a frail national consensus (which appears to reflect the global view) about science, a prudent, rational approach toward ecosystem health seems unlikely. Severe deleterious consequences might shift this view, but then the options for remedial action will be severely restricted, possibly even nonexistent. In this era of economic and technological dominance, the findings of science about global warming and other major environmental issues fall into the category of: 'I wouldn't believe it even if it were true.' Kuhn (1970) stated it more eloquently: 'A paradigm is a belief so strongly held that when contrary evidence appears, the evidence is rejected.' The present societal dilemma is that a significant body of scientific evidence indicates that global warming, resulting from anthropogenic greenhouse gases, should be taken seriously but would require a major shift in human behavior to abate. Accepting this evidence would require substantive changes in both economic and technological practices. Denial of the need to reject the dominant paradigms ('All economic growth is good'; 'There is a technological solution for every problem caused by technology') requires rejection of scientific evidence. If this assumption is correct, then still more confirming evidence will not alter the situation.

There is an alternative to exuberant optimism, however, which is based on rationality and enables us to make wise judgments even in circumstances of moderate to high uncertainty.

THE PRECAUTIONARY PRINCIPLE

The precautionary principle (PP) has 7 commonly occurring themes (Raffensperger & Tickner 1999, p.

24): (1) a willingness to take action in advance of formal justification of proof; (2) proportionality of response; (3) a preparedness to provide ecological space and margins for error; (4) a recognition of the well-being and interests of non-human entities; (5) a shift in the onus of proof onto those who propose change; (6) a greater concern for impacts on future generations; and (7) a recognition of the need to address ecological debts. The rationale for the PP is fairly straightforward (Raffensperger & Tickner 1999, pp. 2–3):

Decisions to take action to restrict potentially dangerous activities are often taken after science has established a causal association between a substance or activity and a well-defined, singular adverse impact. Proving causality takes both extensive time and resources. During this research period, action to prevent potentially irreversible human and environmental harm is often delayed in the name of uncertainty and the harmful activity continues. For a variety of reasons, it may not even be possible to demonstrate a causal association in complex human/ecological systems.

The PP does challenge overemphasis on reductionist science and the still prevalent belief that science will enable humans to transcend natural laws that restrict other species. However, the PP has been accepted by the Rio Declaration (Cameron 1994), the United Nations, and the European Union. The Swedish Chemicals Policy Committee (1997) concluded that PP is applied as much as it should be. Boehmer-Christiansen (1994) discusses the use of the PP in Germany. In the United States, the Toxic Substances Control Act (TSCA), passed in 1976, represents an attempt to establish a mechanism whereby the hazard of the chemical compound to human health and the environment can be assessed *before it is introduced into the environment*. If the chemical substance presents an unreasonable risk of injury to human health or the environment, the administration of the US Environmental Protection Agency (EPA) may restrict the use or ban the chemical substance. This requirement clearly reverses the burden of proof, which is one of the tenets of the PP.

These illustrative examples show support for the concept of the PP, although implementation, if it ever occurs on a significant scale, will be a contentious, no-holds-barred battle because it is perceived as a deadly threat to many financial interests. However, persuasive contrary evidence (Hawken et al. 1999) provides examples of environmentally sensitive, profitable industries. Although Hawken and colleagues do not emphasize the PP, they do promote the protection and enhancement of natural capital, which is a primary goal of the PP.

Myers & Kent (1998) state that a number of goals of

both the PP and natural capitalism can be achieved merely by eliminating perverse subsidies. This elimination will doubtless be fiercely resisted by special interests benefitting from the subsidies. Even so, Myers & Kent (1998) include a number of case histories where perverse subsidies have already been eliminated, although, in some cases, saving money was arguably more important than protecting natural capital.

BIOTIC IMPOVERISHMENT

Nowhere are the fatal consequences of exuberant optimism for endless economic growth on a finite planet more evident than in the extinction rates of both plant and animal species. In August 1999, over 4000 scientists from 100 countries convened in St. Louis, Missouri for the International Botanical Congress (IBC) to discuss a variety of topics, including extinction rates. Dr. Peter Raven, President of IBC, predicted that between one-third and two-thirds of all plant and animal species, most in the tropics, will be lost in the 21st century. As for Internet data on plants in jeopardy, the following are useful:

- World's Biodiversity Becoming Extinct at Levels Rivaling Earth's Past 'Mass Extinctions' (www.sciencedaily.com/releases/1999/08/990804073106.htm)
- XVI International Botanical Congress (www.ibc99.org)
- An Action Plan to Conserve the Native Plants of Florida (<http://everglades.fiu.edu/serp/action/index.html>)
- Earthshots – USGS (<http://edcwww.cr.usgs.gov/earthshots/slow/tableofcontents/>)
- A Survey of the Plant Kingdoms (<http://web1.manhattan.edu/fcardill/plants/intro/>)
- Botanical Society of America (BSA) (www.botany.org)
- American Journal of Botany (www.amjbot.org)

An older but highly regarded source (Wilson 1988) with abundant references on both plants and animals is also useful.

Ironically, many — arguably most — of the status quo economic growth advocates claim to be environmentalists and lovers of nature. At least some of them actually believe this. Whether the love of nature is a façade or a denial of the consequences of their actions is of little importance to the species already gone or those that will soon be driven to extinction by anthropogenic activities. An even greater irony is that the exuberant optimists are probably destroying the planet's ecological life support system, which will cause much human suffering and possibly extinction of their own species. *Homo sapiens* might have only a minor role, in geological time, in the ecological play in the planetary the-

ater. Fossil records suggest that most species had 1 or more fatal flaws that resulted in their extinction. Perhaps the fatal flaw of the human species is exuberant optimism for economic growth.

NATURAL CAPITALISM AND THE PRECAUTIONARY PRINCIPLE

Hawken et al. (1999) advocate another form of economic growth termed 'natural capitalism'. This concept is based on growth in quality that is environmentally sensitive. Hawken et al. (1999) believe that the traditional definition of capital as 'accumulated wealth in the form of investments, factories, and equipment' is inadequate and that an economy should be based on four types of capital to function properly: (a) human capital, in the form of labor, intelligence, culture, and organization, (b) financial capital, consisting of cash, investments, and monetary instruments, (c) manufactured capital, including infrastructure, machines, tools, and factories, and (d) natural capital, consisting of resources, living systems, and ecosystem services. Natural capital envisions the use of natural systems without abusing them, which is the essence of sustainable use of the planet. The trials for this idea have been both temporally and spatially small, but they provide persuasive evidence that humans need not drive other species to extinction, at least not at the present rate. There are no conflicts between the tenets of natural capitalism and the commonly occurring themes of the PP (Raffensperger & Tickner 1999, p. 24). Natural capitalism seems worth a try, since it is far more defensible ethically than present practices. Any system that is based on practices that drive other species to extinction at rates unprecedented in human history is not sustainable.

THE QUEST FOR RATIONALITY

I remain optimistic about what can be done and pessimistic about what will be done. The gap between 'could' and 'will' appears to be the result of what Hardin (1999) terms 'the ostrich factor', based on the well-known tale attributed to Pliny the Elder around AD 1 (as quoted in Bierens de Haan 1943). Is the refusal to acknowledge the existence of things unseen (e.g., global warming, species extinction) the fatal flaw of human society? Can humans morally and ethically not accept the fate they have meted out to countless other species in the name of progress? Such reflections as this question are usually brushed off as 'gloom and doom'. This denial has been true from Malthus (1798) to Carson's (1962) 'The Silent Spring' to Colborn's

research with endocrine disrupters (Colburn et al. 1996).

'SOFT' ECONOMICS/'SOFT' ECOLOGY

In science, the word 'soft' is usually used as a pejorative to mean assumptions that are not amenable to the experimental approach. In both economics and ecology, it is extraordinarily difficult to establish cause/effect relationships. Mechanisms are often established in both, but serious difficulties result in establishing their relative importance. Despite the common origin of the words 'economics' and 'ecology', there is little consilience in their dominant paradigms. In both economics and ecology, there are areas of massive ignorance. Still, areas exist where cause and effect are quite clear! For example, loss of habitat has deleterious effects upon the species that inhabit it. However, multidimensional synthesis is difficult but essential to both economics and ecology. There is, however, one enormous difference. Economics is associated by laypersons with material affluence and gracious living, while ecology is associated with 'human deprivation' for the sake of critters. Human society celebrates the former and is uncomfortable discussing the latter.

THE POSSIBILITY OF A PARADIGM SHIFT

Major paradigm shifts occurred in the 20th century that were 'unthinkable', often until the very time they occurred. If alternative paradigms are fairly clear, the probability of society making rational choices is enhanced but not assured. Sustainable use of the planet and a more harmonious relationship with the biosphere based on natural capitalism and the precautionary principle may well replace the exuberant optimism about perpetual economic growth and freedom from limiting factors. It is always well to have a Plan B, just in case Plan A fails! As Ehrlich (2000) notes,

So here we are, small-group animals trying to live, with increasingly rare exceptions, in gigantic groups—trying to maintain health, happiness, and a feeling of connectedness in an increasingly impersonal world in which individual natures are based on even smaller fractions of society's culture.

If individuals do not collectively strike a balance between economic growth and sustainability, nature will make sure that the balance is achieved, regardless of the impact on individuals. In a very real sense, both those primarily concerned about the economy and those primarily concerned about the environment have a cautious and exuberantly optimistic component.

Those favoring economic growth are very cautious about inflation, productivity, profitability, and the like. They often optimistically believe that the ecological life support system will not be irreparably degraded by economic growth. Those favoring the environment would like to see more concern about possibly or probably adverse effects of economic growth upon natural systems. They optimistically believe that sustainable use of the planet is possible, although there is no robust, validated working model fairly certain to achieve this result.

CONCLUSION

Clearly, further alienation of these groups from each other will not result in sustainable practices. Claims of each side to be rational and attributing irrationality to the other side are not likely to result in a viable new paradigm either. However, moderation in both optimism and caution by both sides just might result in a workable paradigm. The possibility is certainly worth exploring, if only because the alternatives appear so dismal.

Optimism is a blessing if tempered by reason. A reasoned approach requires a free and open exchange of ideas in an atmosphere of civility. Demonizing those with opposing views impedes a free and open exchange of ideas and, worse yet, gives zealots power far beyond that justified solely by merit. Paradigms can be valuable steps on the path toward enlightenment, but should never be regarded as the ultimate truth, because this implies a climax to the process of reasoning. We should celebrate the multiplicity of human natures and the diversity of paradigms, because we inhabit a dynamic world where making judgments is a continuing requirement.

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